

MEMORANDUM

To: 802.11 Working Group

From: Paul Nikolich, Chairman IEEE 802 LMSC

Date: July 19, 2007

Re: CSIRO Patent

As per the March 2007 802.11 plenary session minutes, members of the 802.11 Working Group have been made aware of a "possible patent overlay" from CSIRO ("CSIRO Patent," U.S. Patent No. 5,487,069 (the '069 patent), issued on January 23, 1996.) Since March, additional information has become available regarding the patent holder and is offered here for consideration in the future development of 802.11 standards. This memorandum briefly summarizes the patent and the recent litigation against Buffalo.¹

I. Introduction

In February 2005, Commonwealth Scientific and Industrial Research Organisation (CSIRO) brought a patent infringement claim against Buffalo Technology (USA), Inc. in the U.S. District Court for the Eastern District of Texas. In May 2006, the court issued a "Markman" ruling that interpreted what the claims in the patent mean. In November 2006, the court granted "summary judgment" (that is, a judgment without a full trial) to CSIRO, finding that the patent was not invalid and that the Buffalo products at issue infringed the '069 Patent. In June 2007, the court awarded a permanent injunction that prohibits Buffalo from "infringing United States Patent No. 5,487,069 ("the '069 patent") by making, using, offering to sell, or selling within the United States or importing into the United States, any of the Buffalo products compliant with the IEEE 802.11a or 802.11g standards and which were accused of infringement in this action or any products which are no more than colorably different from those accused products." The injunction was "stayed" (suspended) for 45 days. In July 2007, Buffalo filed a notice of appeal.

The '069 patent relates to a wireless local area network (LAN) wherein a plurality of wireless transceivers communicate with a plurality of wireless hub transceivers. The patent provides a solution to transmitting data at a high rate and with high reliability using radio frequency (RF) signals within an indoor environment. The patent teaches a combination of three techniques: parallel sub-channels (ensemble modulation) wherein the period of a sub-channel symbol is longer than a predetermined time delay of the non-direct transmission paths, data reliability enhancement with forward error correction (FEC), and data reliability enhancement with bit interleaving. Absent any additional limitation in the claims, radio frequencies have been interpreted to mean "frequencies in the portion of the electromagnetic spectrum that is between the audio-frequency portion and the infrared portion."² The Texas

¹ *Commonwealth Scientific and Industrial Research Organisation v. Buffalo Technology (USA), Inc. and Buffalo, Inc.*, 6:06-CV-00324 LED (E.D. Texas).

² Claim Construction Memo. Op. at 7.

district court also interpreted the “confined multipath environment” recited in the claims to mean an “indoor environment.”³

The district court described the history as follows:

In 1998, the Institute of Electrical and Electronics Engineers ("IEEE") contacted CSIRO to request assurance that CSIRO would license its '069 patent to companies wanting to implement the IEEE's 802.11a standard on reasonable and non-discriminatory ("RAND") terms once the IEEE approved the 802.11 standard, which pertains to WLANs. CSIRO agreed. In 1999, the IEEE ratified the 802.11a standard, which embodies the core technology invention by CSIRO. The IEEE also ratified the 802.11b standard, which differs from CSIRO's invention, and was initially adopted by more companies. In 2003, the IEEE ratified the 802.11g standard, which also embodies CSIRO's invention.

. . .

Since Buffalo utilizes the IEEE 802.11a and g standards, this suit would serve as a test case to determine whether WLANs compliant with IEEE 802.11a and g standards infringe the '069 patent and to determine the validity of the '069 patent in light of the prior art.⁴

II. Brief Summary of the '069 Patent

In patent law, a claim sets out the metes and bounds of the property covered by a patent. A patent typically includes two types of claims: “independent claims” and “dependent claims.” An “independent claim” is one that does not reference other claims. A “dependent claim” references one or more claims. The effect of referencing a claim is to incorporate the elements of the referenced claim.

A. The Independent Claims

All of the claims contain “means-plus-function” language, the interpretation of which is performed in accordance with 35 U.S.C. § 112, 6. Infringement of claims having such language requires that the accused device include an identical or equivalent structure to that disclosed in the patent and perform the identical function recited in the claim. As a result, claim interpretation of “means-plus-function” language requires a court to identify the structure disclosed in the patent that performs the claimed function.

1. Independent Claims 1 and 10 – Wireless LAN

These claims require a plurality of hub wireless transceivers and a plurality of mobile wireless transceivers coupled to data processors. The transceivers communicate via RF transmissions in an indoor environment. Each transceiver includes an antenna (a component

³ Claim Construction Memo. Op. at 5.

⁴ Perm. Injunction Memo. Op. at 3-4.

for radiating or receiving radio waves), a transmission signal processor coupled to an input data channel, and a reception signal processor coupled to an output data channel. The transmission signal processor also includes modulation means that modulates input data of the input data channel into a plurality of sub-channels comprised of a sequence of data symbols such that the period of a sub-channel symbol is longer than a predetermined period representative of the time delay of significant ones of non-direct transmission paths.

The Texas District Court found that the modulation means corresponds to the Complex Fast Fourier Transform (FFT) Based Modulator in block 32 of Fig. 6, executing the 16 Point Complex Inverse FFT (IFFT) of block 47 of Fig. 7 as described in the `069 patent at column 6, lines 23-31.⁵

Independent claim 1 is limited to include transceivers operable to transmit and receive data at radio frequencies in excess of 10 GHz.

Independent claim 10 has no RF frequency limitation. However, in addition to the features of claim 1, this claim also requires inclusion of “means to apply a data reliability enhancement to the data passed to the modulation means” and “means for interleaving blocks of data” interposed between the data reliability enhancement means and the modulation means.

The Texas district court interpreted the “means to apply data reliability enhancement” as corresponding to the Rate $\frac{1}{2}$ Trellis Coded Modulation (TCM) Encoder described in block 42 of Fig. 7 and at column 6, lines 32-46 of the `069 patent.⁶

The court also interpreted the “means for interleaving blocks of data” as corresponding to the Di-Bit Interleaver described in block 43 of Fig. 7 of the `069 patent.⁷

2. Independent Claims 17 and 26 – Peer-to-Peer Wireless LAN

These claims are similar to claims 1 and 10 above, except that they do not require hub transceivers. Claims 17 and 26 require a plurality of mobile wireless transceivers coupled to data processors. The transceivers communicate via RF transmissions in an indoor environment. Each transceiver includes an antenna, a transmission signal processor coupled to an input data channel, and a reception signal processor coupled to an output data channel. The transmission signal processor also includes modulation means that modulates input data of the input data channel into a plurality of sub-channels comprised of a sequence of data symbols such that the period of a sub-channel symbol is longer than a predetermined period representative of the time delay of significant ones of non-direct transmission paths.

Independent claim 17 is limited to include transceivers operable to transmit and receive data at radio frequencies in excess of 10 GHz.

Independent claim 26 has no RF frequency limitation. However, in addition to the features of claim 17, this claim also requires inclusion of “means to apply a data reliability enhancement to the data passed to the modulation means” and “means for interleaving blocks of data” interposed between the data reliability enhancement means and the modulation means.

⁵ Claim Construction Memo. Op. at 13.

⁶ Claim Construction Memo. Op. at 15.

⁷ Claim Construction Memo. Op. at 16.

The terms used in claims 17 and 26 have the same interpretation as described above with reference to claims 1 and 10.

3. Independent Claims 33 and 42 – A transceiver for operating in an indoor environment

These claims recite a transceiver including an antenna, a transmission signal processor coupled to an input data channel, and a reception signal processor coupled to an output data channel. The transmission signal processor also includes modulation means that modulates input data of the input data channel into a plurality of sub-channels comprised of a sequence of data symbols such that the period of a sub-channel symbol is longer than a predetermined period representative of the time delay of significant ones of non-direct transmission paths.

Independent claim 33 is limited to include transceivers operable to transmit and receive data at radio frequencies in excess of 10 GHz.

Independent claim 42 has no RF frequency limitation. However, in addition to the features of claim 33, this claim also requires inclusion of “means to apply a data reliability enhancement to the data passed to the modulation means” and “means for interleaving blocks of data” interposed between the data reliability enhancement means and the modulation means.

The terms used in claims 33 and 42 have the same interpretation as described above with reference to claims 1 and 10.

4. Independent Claims 49 and 56 – A transmitter for operating in an indoor environment

The claimed transmitter includes an antenna and a transmission signal processor coupled to an input data channel. The transmission signal processor includes modulation means that modulates input data of the input data channel into a plurality of sub-channels comprised of a sequence of data symbols such that the period of a sub-channel symbol is longer than a predetermined period representative of the time delay of significant ones of non-direct transmission paths.

Independent claim 49 is limited to include transmitters operable to transmit data at radio frequencies in excess of 10 GHz.

Independent claim 56 has no RF frequency limitation. However, in addition to the features of claim 49, this claim also requires inclusion of “means to apply a data reliability enhancement to the data passed to the modulation means” and “means for interleaving blocks of data” interposed between the data reliability enhancement means and the modulation means.

The terms used in claims 49 and 56 have the same interpretation as described above with reference to claims 1 and 10.

5. Independent Claims 61 and 68 – A method for transmitting data in an indoor environment

These claims recite a method for transmitting data provided by an input data channel coupled to a signal processor, which is coupled to an antenna, in an indoor environment including the following steps:

- (a) modulating the data into a plurality of sub-channels comprised of a sequence of data symbols such that the period of a sub-channel symbol is longer than a predetermined period representative of the time delay of significant ones of non-direct transmission paths; and
- (b) transmitting the sub-channel symbols by the antenna.

Independent claim 61 is limited to require transmitting the data at radio frequencies in excess of 10 GHz.

Independent claim 68 has no RF frequency limitation. However, in addition to the features of claim 61, this claim also requires the steps of:

- (c) apply data reliability enhancement to the data; and
- (d) interleaving blocks of the enhanced data.

B. Additional Claim Construction by the Texas District Court

A number of the dependent claims (claims 8, 15, 24, 31,40, etc.), recite “demodulation means” or “ensemble demodulation means.” These terms were found to be synonymous by the court.⁸ The court also concluded that the claimed demodulation means corresponded to the FFT-Based Complex Differential Demodulator in block 33 of Fig. 6, executing the 16 Point FFT of block 63 of Fig. 8 of the ‘069 patent.⁹

C. Outcome of CSIRO v. Buffalo Tech.

In granting the plaintiff CSIRO’s motion for partial summary judgment, the district court found claims 10-16, 26-32, 42-48, 56-60, and 68-72 of the ‘069 patent valid (technically, that they were “not invalid”) despite a number of prior art references asserted by Buffalo.¹⁰ The court also concluded that Buffalo infringed claims 42-48, 56-60 and 68-72.¹¹

III. Working Group Considerations

The 802.11 Working group and subgroups are not an appropriate forum for discussion of either the validity of the ‘069 Patent or the merits of CSIRO’s claims against Buffalo.¹² The fact that CSIRO has asserted its patents (and that one district court has found its claims valid and infringed by products compliant with 802.11a and 802.11g), however, is a commercial fact that the working group can take into consideration in its development of 802.11n.

⁸ Claim Construction Memo. Op. 14.

⁹ Id.

¹⁰ Summary Judgment Memo. & Order at 34.

¹¹ Id. at 26, 34.

¹² The IEEE-SA has not taken any position on the claims asserted in that litigation.

Under the IEEE-SA policies, the working group can take relative cost into consideration as one factor in developing a standard:

Different technical approaches may have different benefits, and a sensible comparison may involve an understanding of whether or not the technical differences would justify the cost differential (if known). Nevertheless, as a matter of policy, the IEEE-SA recommends that meetings of technical experts remain just that – technical meetings. While technical meetings should remain focused on the complexity, performance, and quality implications of proposals, they should also permit sufficient discussion to enable participants to understand the relative cost differentials (or to be able to take information back to their respective companies to have that kind of discussion and analysis internally).¹³

This is not to say either that the working group should or should not adopt an approach that may be covered by the '069 Patent – simply that relative cost differences are a legitimate consideration.

The IEEE-SA has requested a Letter of Assurance from CSIRO but has not yet received either an LOA or any indication that one will be forthcoming.

¹³ *Promoting Competition and Innovation: What You Need to Know about the IEEE Standards Association's Antitrust and Competition Policy* (available at <http://standards.ieee.org/resources/antitrust-guidelines.pdf>).